

# Time of Sunrise and Sunset at Singapore and Penang throughout the Year.

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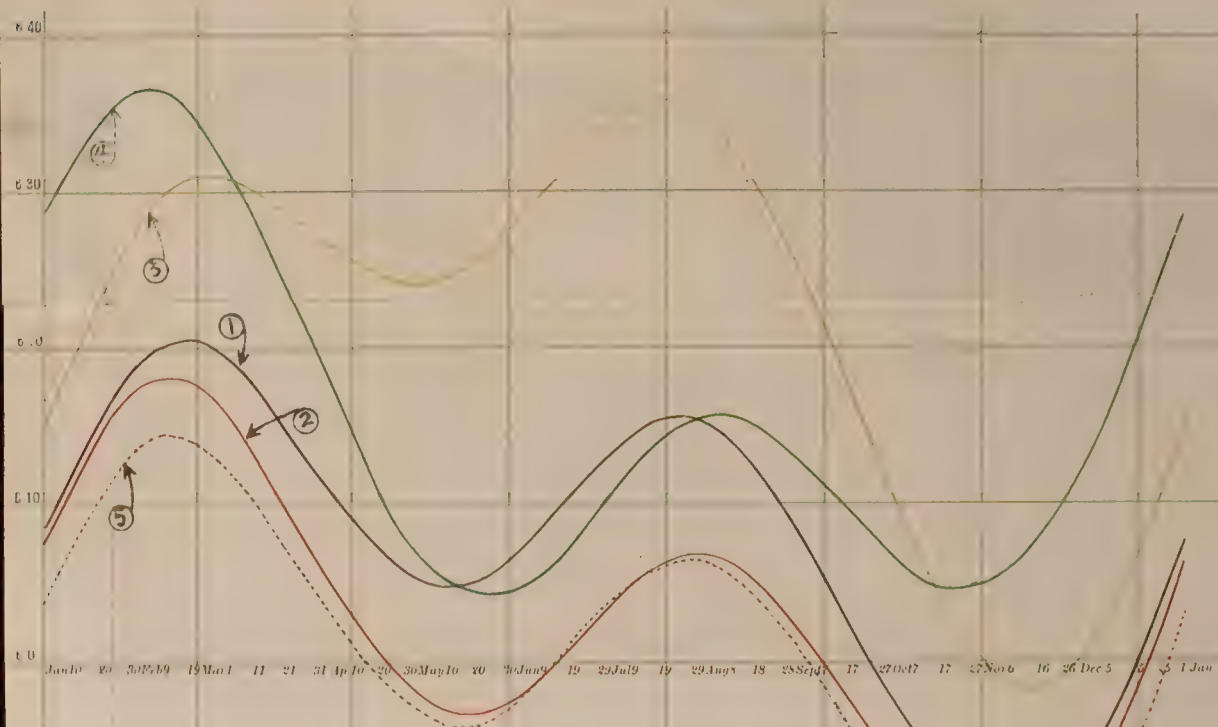
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Accompanying this note is a chart showing the times of sunrise and sunset at Singapore and Penang throughout the year.

Each space on the chart represents horizontally an interval of five days and vertically one minute.

A dotted curve shows the 'equation of time' (*i.e.* the difference between apparent solar time as indicated by a sun-dial and mean-time as recorded by the clock). Bearing in mind that by using the standard time of the 105th degree of longitude instead of that of our own longitude of  $103^{\circ} 50'$ , our clocks in Singapore are 4 minutes 40 seconds ahead of the true time, this dotted line shows how very small is the variation due to our small northern latitude. In Penang the corresponding amount of 'daylight saving' is 18 minutes 36 seconds, but in addition there is quite an appreciable variation on account of latitude. In Singapore the difference between the lengths of the longest and shortest days in the year is only about 9 minutes, in Penang the difference is  $36\frac{1}{2}$  minutes. At both places there are two maxima and two minima in the curves, but while in Singapore the longest evenings are in February and are entirely caused by the 'equation of time,' in Penang the effect of latitude is sufficient to make the evenings longer in July than in February.

The times calculated are the Singapore standard times at which the centre of the sun's disc is visible on the horizon to an observer at the sea level, allowance being made for the fact that owing to refraction the sun is visible when in reality it is  $36'$  below the horizon.



- ① SINGAPORE SETTING
- ② " RISING
- ③ PENANG SETTING
- ④ " RISING
- ⑤ EQUATION OF TIME